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of the best agricultural lands is still of the kind that exhausts fertility and makes crop failures inevitable.

In the use of the iron ore deposits there is not even the possibility of duplication in preventing the exhaustion of supply. The rate of utilization has for several years been going on at from 25,000,000 to 30,000,000 tons a year. The country has been taking out, say 400,000 tons of copper a year and the coal mines of the country yield 475,000,000 tons. The annual lumber and timber products, including fire and pulp wood, are probably valued at no less than \$1,000,000,000. Excepting agriculture and lumbering, there is no possible way of replenishing supplies once exhausted, except by the discovery of new sources of production.

The forests, the coal beds, the iron ore and the copper, along with the fertility of the soil, are essential parts of the capital of the nation. The annual output from them is not simply income; it is to a large extent a spending of capital. Expenditure of capital resources always points to a time when the community will be put to the necessity of finding substitutes for any one or more of these fundamental elements of national strength. Without attempting to forecast the time of such exhaustion the policy of the present requires that efforts be made in two directions to put off as far as possible the day of reckoning. For the nation that has lost its elements of might in material resources cannot hope to maintain its ascendancy among its more powerful and farsseeing competitors.

The two things which a nation can do are to economize consumption and to discover substitutes. The natural effect of rapid consumption is productive of higher prices, which in themselves supply an automatic check. But before the check of advancing prices sets in there are always wasteful methods at work which are themselves to no small extent the cause of advancing prices. Only after billions of dollars have been lost in the treatment of the soil, of the forests and the mines, does the policy of more economical management force itself upon those in control. The natural law of supply and demand compels man in his

treatment of nature to become a better husbandman. Yet this is too much like locking the stable after the theft of the horse fully to meet the case.

The real remedy for rapid and wasteful exhaustion of natural resources is to be found in technical and scientific research. The endowment of such research is one of the greatest financial problems of American industry. The state and federal governments have already provided for agriculture and applied foresight to the use of the public forests. The consolidation of iron ore properties under the control of a smaller number of large corporations is in itself a promise of a more economical method of handling them. But the real gain must come from the laboratory, whether in the iron and steel plant or in the experimental rooms of our universities and technical schools. The single item of applying electricity economically to the smelting of ores would in itself, for instance, be worth thousands of times the cost of experimentation and research in a single year's output.—*Wall Street Journal*.

ABSTRACTS FOR EVOLUTIONISTS

Madreporarian Corals.—In a magnificent work on the Madreporaria of the Hawaiian Islands and Laysan,¹ Dr. T. W. Vaughan takes up the difficult questions relating to the species and varieties of these animals, and while leaving them unsettled, gives a most interesting and suggestive discussion, with an abundance of facts, and very good illustrations, the latter occupying no less than ninety-six large plates. The following quotations will be of general interest:

Variation in corals is, we know, great and complex. If we knew its limits, we should know the limits of the different species. Bernard, in cataloguing the Perforate Corals of the British Museum (Natural History), experienced so much difficulty in defining them from the collections at his disposal that he decided to abandon the Linnean system of nomenclature, and to use in his catalogues a geographical number system (p. 4).

Studies of variations, such as those contained in this paper, may appear elaborate to persons who have not gone deeply into the subject, but in reality they are of only a preliminary nature, for

¹ Bulletin 59, U. S. National Museum, 1907.

as stated in the introductory remarks, "there is on every side an insufficiency of data," and consequently it is not possible to solve many of the fundamental problems pertaining to the group. The study of variation is inseparable from experimental physiological investigations, for these are a necessary foundation for the understanding of variation (p. 6).

The author then goes on to distinguish between *gametic* and *vegetative* variation, and to outline the methods whereby these might be studied experimentally. He expresses the hope that the necessary investigations may be undertaken by the marine biological stations. Under *Porites compressa* (pp. 174-193) there is given a full account of twenty types of variation, called forms and subforms.

The variation appears to be continuous, but with a number of definite secondary modes, should they be plotted into a specific curve. . . . We have no facts by which it could be ascertained whether the differences are of gametic or vegetative origin.

Antarctic Pteropod Mollusca.—In the report of the British National Antarctic Expedition (1907), Sir Charles Eliot discusses the Pteropods of the southern seas, and calls attention to the fact that "in both the Arctic and Antarctic seas the predominant, and as we approach the Poles probably the only Pteropods are closely allied, or even identical species of *Limacina* and *Clione*." The distribution of these forms is interrupted by a wide zone in which they do not occur, none having been recorded from within thirty degrees either north or south of the equator. Sir Chas. Eliot remarks:

I confess that I have seen no explanation of these facts which appears to me satisfactory. Our knowledge of the direction in past ages of ocean currents which must have largely determined the distribution of pelagic forms is slight, and our record of fossil Pteropods is very imperfect (p. 3).

The Lizard-genus Leiopisisma.—Dr. L. Stejneger, in his recent admirable revision of the Reptiles and Amphibians of Japan,² gives an account of *Leiopisisma laterale* (Say), a lizard which in North America inhabits the lower Austral zone east of the Rocky Mountains, but is not found at all in the west. It

² Bulletin 58, U. S. National Museum, 1907.

reappears in Asia, occurring over a large area in China, and exists also in the Riu Kiu islands. The Chinese animal has been separated as *L. reevesii* (Gray), but Boulenger failed to find any distinctive characters to separate it, and Dr. Stejneger "upon the most searching comparison" has also utterly failed to discover any difference. The remaining species of the genus belong to the Old World. In speaking of the Scincidae in general, Dr. Stejneger says: "Many species have an enormous geographic range, owing to the ease with which they may be accidentally transported," but there is no reason to suppose that the distribution of *L. laterale* should be explained in that way. Probably many genera of lizards are of great antiquity. When recently at the Museum of Comparative Zoology I was shown by Mr. Samuel Henshaw a small lizard perfectly preserved in amber. Instead of being some strange extinct form, as one might have expected, it had all the appearance of a modern *Gekko*, and presumably belongs to that genus. It is scarcely necessary, of course, to refer to the fact that the case of *Leiopisisma* parallels several others known among plants, the molluscan *Philomycus*, etc., though the absolute *specific* identity is very remarkable, especially in a vertebrate.

A Mollusc New to Ireland.—Mr. J. W. Taylor³ has published a very interesting account of the discovery of *Vitrina elongata* (Draparnaud) in Ireland. It is a species which occurs commonly in the mountain regions of Central Europe, and also in Spain, and Mr. Taylor thinks it formerly had a much wider distribution, but has been driven out of many regions by stronger or more dominant species. Its survival in Ireland he attributes to the easier conditions (from the standpoint of the *Vitrina*) existing there.

A Grass Common to Ecuador and Guatemala.—In a recent account of some Guatemalan plants,⁴ Dr. B. L. Robinson and Mr. H. H. Bartlett call attention to the discovery of the anomalous genus of South American

³ *Irish Naturalist*, August, 1907.

⁴ *Proc. Amer. Acad.*, June, 1907.

grasses, *Streptochaeta*, in Guatemala. The species proves to be *S. sodiroana* Hack, described from Ecuador, the determination having been confirmed by Professor Hackel himself:

This is by no means an isolated case of the occurrence of identical species in Ecuador and Guatemala, but it has peculiar interest from the marked character and rarity of the plant concerned (p. 50).

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CURRENT NOTES ON METEOROLOGY AND CLIMATOLOGY

MONTHLY WEATHER REVIEW

Nos. 5 and 6, *Monthly Weather Review*, 1907, contain the following articles of the most general interest:

"Guilbert's Rules for Weather Prediction," by Dr. Oliver L. Fassig. Guilbert prepared a paper for the competition organized by the Belgian Astronomical Society, "in order to bring out the present state of the art of predicting the weather."

"Principles of Forecasting the Weather," by Gabriel Guilbert, of Caen. This sets forth the method followed by the writer, which is based on the principle of the *normal wind*. Those who are interested in weather forecasting, either practically or theoretically, will find this discussion worthy of serious attention.

"The Relation of the Movements of the High Clouds to Cyclones in the West Indies," by J. T. Quin; a further contribution to the discussion by the late Father Benito Viñes, prepared for the Chicago Meteorological Congress of 1893.

"Memorandum on the Gulf Stream and the Weather," by Professor Abbe; a sane statement of the extent to which the Gulf Stream does *not* affect our weather.

"The Cold Spring of 1907," by Professor A. J. Henry; a review of the weather map features which produced the cold weather of last spring, coupled with the following: "The underlying causes of the recent cold weather are probably obscure and deep seated."

"Value of Weather Forecasts to Natural

Gas Companies," in which the importance of forecasts of colder weather, with increased need of gas, is emphasized.

"Tornado at Wills Point, Texas, May 25, 1907," illustrated by two snap-shot photographs. Such photographs, although still rare, are fortunately becoming more numerous.

"Relations of the U. S. Weather Bureau to the Railroad Man," an address delivered by H. W. Richardson, local forecaster at Duluth, Minn., before the Northern Railway Club; contains notes on many interesting phases of the relation between weather and railroading.

"Legal Decisions as to Cyclones," being the opinion in full, of Judge Philips, of the United States Circuit Court of Appeals, Eighth Circuit, Minnesota.

"Hythers and the Comparison of Climates," by W. F. Tyler; a discussion of the question of sensible temperatures.

"Foehn in New South Wales," an extract from an account published in 1837.

"The St. Swithin's Day Fallacy," by J. H. Morrison. "It would seem to be almost useless to say anything further regarding the absurdity of the old superstition, with such an array of tell-tale figures all set against the legend."

"The Santa Ana of California," quotation from Professor Geo. E. Hale (*An. Vol. Carnegie Inst.*, 1906).

"Equinoctial Storms," by Professor E. B. Garriott. "There is no one special storm to which the term '*the equinoctial*' should be applied."

FORESTS AND RAINFALL

DR. J. SCHUBERT, director of the meteorological section of the Prussian Forestry School at Eberswalde, has recently published the results of his continued studies on forest influences in two papers. In one of these ("Der Niederschlag in der Setzlinger Heide," 1901-5; *Zeitschr. f. Forst und Jagdwesen*, 1907, No. 8) it is pointed out that of seventeen stations in forest, on the forest edge and in the open, the forest stations show a greater precipitation (1901-5), and the stations in the